

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

Claim 1 (currently amended): A method for filtering data, the method comprising:

- 5 receiving a plurality of data samples;
 computing a locus of the samples;
 initially normalizing a value of an input sample to a range centered on the locus;
 after normalizing the value of the input sample, passing the data through a distance-based
filter; and
10 normalizing an output value of the distance-based filter to a predetermined output range;
 and
 ~~limiting the normalized output value of the distance-based filter within selected limits of~~
normalization.

- Claim 2 (original): The method of claim 1 wherein the distance-based filter further comprises a
15 median filter.

Claim 3 (original): The method of claim 1 wherein the distance-based filter further comprises a
low-pass filter.

Claim 4 (original): The method of claim 1 wherein the distance-based filter further comprises one
of a band-pass filter and a high-pass filter.

- 20 Claim 5 (original): The method of claim 1 wherein computing a locus of the samples comprises
computing an average of a last two of the samples.

Claim 6 (original): The method of claim 1 wherein computing a locus of the samples comprises
computing one of an arithmetic mean, a geometric mean, a harmonic mean, and a quadratic mean
of the samples.

Claim 7 (original): The method of claim 1 wherein computing a locus of the samples comprises computing an average of a last two of the samples together with the input sample.

Claim 8 (original): The method of claim 1 wherein computing a locus of the samples comprises computing an average of a last three of the samples.

- 5 Claim 9 (previously presented): A method for filtering data, the method comprising:
- receiving a plurality of data samples;
 - computing a locus of the samples by computing an average of a last three of the samples together with the input sample;
 - normalizing a value of an input sample to a range centered on the locus;
 - 10 passing the data through a distance-based filter; and
 - normalizing an output value of the distance-based filter to a predetermined output range.

Claim 10 (original): The method of claim 1 wherein computing a locus of the samples comprises selecting a previous filter output value.

- Claim 11 (currently amended): A method for filtering data, the method comprising:
- 15 determining a current locus of a plurality of data samples as a function of signal history;
- determining a current normalizing range as a function of the current locus;
- normalizing an input value to the current normalizing range;
- after normalizing the input value to the current normalizing range, passing the input value
- and the current locus through a distance-based filter; and
- 20 normalizing an output value of the distance-based filter to the current normalizing range;
- and
- ~~adjusting the output value of the distance-based filter and internal filter storage within a selected output range.~~

- Claim 12 (original): The method of claim 11 wherein the distance-based filter is one of median
- 25 filter, a low-pass filter, a high-pass filter, and a band-pass filter.

Claim 13 (original): The method of claim 11 wherein determining a current locus of the data samples further comprises determining one of an arithmetic mean, a geometric mean, a harmonic mean, and a quadratic mean of the data samples.

Claim 14 (currently amended): A filter device, comprising:

- 5 a means for receiving a plurality of data samples;
 a means for computing a locus of the samples;
 a means for normalizing a value of one or more of the data samples to a range centered on
the locus;
 a means for computing a distance between ~~an~~ a normalized input value and the locus; and
10 a means for determining an output value as a function of a difference between the input
value and one of the plurality of data samples; ~~and~~
 ~~a means for limiting the output value within selected limits of normalization.~~

Claim 15 (original): The filter device of claim 14, further comprising a means for comparing the distance between the input value and the locus with a predetermined threshold value.

- 15 Claim 16 (original): The filter device of claim 15, further comprising a means for normalizing the distance between the input value and the locus when the distance exceeds a predetermined limit.

Claim 17 (original): The filter device of claim 16 wherein normalizing the distance between the input value and the locus includes adjusting the sample to be within one-half circle of the locus.

- 20 Claim 18 (original): The filter device of claim 14, further comprising a means for comparing the output value with a predetermined threshold value.

Claim 19 (original): The filter device of claim 18, further comprising a means for normalizing the output value when the output value exceeds a predetermined limit.

Claim 20 (original): The filter device of claim 19 wherein normalizing the output value includes adjusting the output value to be within a predetermined output range.

- 25 Claim 21 (currently amended): A system for circular distance normalization of filtered data, the system comprising:

a) a first memory for storing a plurality of machine instructions;
b) a second memory for storing a plurality of data samples; and
c) a processor coupled to the first and second memories, the processor executing the plurality of machine instructions to implement a plurality of functions, the functions including:

5 i) processing at least a portion of the plurality of data samples to compute a locus of the samples;

ii) normalizing at least a portion of the plurality of data samples to a range centered on the locus;

iii) computing a distance between an input value and the locus;

10 ~~iii~~ iv) determining an output value by computing a difference between the input value and one of the plurality of data samples; and

~~iv v)~~ v) providing the output value; and

~~v) limiting the output value within selected limits of normalization.~~

Claim 22 (original): The system of claim 21 wherein the function of determining an output value
15 includes applying a distance-based filter to the plurality of data samples.

Claim 23 (original): The system of claim 21 wherein the functions executed by the processor further include normalizing the distance between the input value and the locus when the distance exceeds a predetermined threshold value.

Claim 24 (original): The system of claim 21 wherein the functions executed by the processor
20 further include normalizing the output value when the output value exceeds a predetermined threshold value.

Claim 25 (original): The system of claim 21 wherein the function of processing at least a portion of the plurality of data samples to compute a locus of the samples includes computing an approximation of the locus of the samples.

25 Claim 26 (original): The system of claim 25 wherein computing a locus of the samples comprises computing an average of data samples retrieved from the second memory.

Claim 27 (original): The system of claim 21 wherein computing a locus of the samples comprises computing an average of a plurality of recent data samples.

Claim 28 (currently amended): A computer program product for filtering data, wherein the computer program product comprises:

5 a computer-readable storage medium; and
 computer-readable program code means embodied in the medium, the computer-readable program code means comprising:

 first computer-readable program code means for determining a locus of a received plurality of data samples,

10 second computer-readable program code means for normalizing a value of an input sample to a range centered on the locus determined from the first computer-readable program code means,

 third computer-readable program code means ~~are included for distance-based~~ filtering of the data, and

15 fourth computer-readable program code means ~~are included for normalizing an~~ output value of the distance-based filter, and

~~fifth computer-readable program code means are included for adjusting the filter output value and internal filter storage locations to remain within selected limits of normalization.~~

20 Claim 29 (original): The computer program product of claim 28 wherein the first computer-readable program code means determines the locus of the samples by determining an average of at least a portion of the data samples.

 Claim 30 (original): The computer program product of claim 28 wherein the first computer-readable program code means determines the locus of the samples by determining an average of at
25 least a last two of the data samples.

 Claim 31 (original): The computer program product of claim 28 wherein the first computer-readable program code means determines the locus of the samples by determining an average of at least a last two samples together with the input sample.

Claim 32 (original): The computer program product of claim 28 wherein the first computer-readable program code means determines the locus of the samples by determining an average of at least a last three of the data samples.

Claim 33 (currently amended): A computer program product for filtering data, wherein the computer program product comprises:

a computer-readable storage medium; and

computer-readable program code means embodied in the medium, the computer-readable program code means comprising:

first computer-readable program code means for determining a locus of a received plurality of data samples by determining an average of at least a last three of the data samples together with the input sample,

second computer-readable program code means for normalizing a value of an input sample to a range centered on the locus determined from the first computer-readable program code means,

third computer-readable program code means ~~are included~~ for distance-based filtering of the data, and

fourth computer-readable program code means ~~are included~~ for normalizing an output value of the distance-based filter.

Claim 34 (original): The computer program product of claim 28 wherein the first computer-readable program code means determines the locus of the samples by selecting a previous filter output value.

Claim 35 (currently amended): The computer program product of claim ~~28~~ 33 wherein the distance-based filtering of the third computer-readable program code means further comprises a median filtering.

Claim 36 (currently amended): ~~The computer program product of claim 28 wherein the~~ A computer program product for filtering data, wherein the computer program product comprises:

a computer-readable storage medium; and

computer-readable program code means embodied in the medium, the computer-readable program code means comprising:

5 first computer-readable program code means determines the for determining a locus of the a received plurality of data samples by computing relative to at least a portion last three of the samples together with the input sample one of an arithmetic mean, a geometric mean, a harmonic mean, and a quadratic mean,

second computer-readable program code means for normalizing a value of an input sample to a range centered on the locus determined from the first computer-readable program code means,

10 third computer-readable program code means for distance-based filtering of the previously normalized data, and

fourth computer-readable program code means for normalizing an output value of the distance-based filter.

Claims 37-48 (cancelled)

15 Claim 49 (previously presented): The method of claim 1 wherein receiving a plurality of data samples further comprises receiving a plurality of normalized data samples.

 Claim 50 (previously presented): The method of claim 11, further comprising normalizing a plurality of data samples, and

20 wherein determining a current locus of a plurality of data samples as a function of signal history further comprises determining a current locus of a plurality of the normalized data samples.

 Claim 51 (previously presented): The filter device of claim 14 wherein the means for receiving a plurality of data samples further comprises a means for receiving a plurality of normalized data samples.

25 Claim 52 (previously presented): The system of claim 21 wherein the second memory for storing a plurality of data samples further comprises a memory for storing a plurality of normalized data samples.

Claim 53 (currently amended): The computer program product of claim ~~28~~ 33 wherein the first computer-readable program code means for determining a locus of a received plurality of data samples further comprises computer-readable program code means for determining a locus of a received plurality of normalized data samples.

5 Claim 54 (currently amended): ~~The computer program product of claim 1 wherein~~ A method for filtering data, the method comprising:

receiving a plurality of data samples;

computing a locus of the samples;

normalizing a value of an input sample to a range centered on the locus;

10 passing the data through a distance-based filter;

normalizing an output value of the distance-based filter to a predetermined output range;

and

limiting the normalized output value of the distance-based filter within selected limits of normalization, including ~~further comprises~~ adjusting the filter output value and the internal filter storage locations to remain within the selected limits of normalization.

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Claim 55 (previously presented): The computer program product of claim 54 wherein adjusting the filter output value and the internal filter storage locations further comprises adjusting the filter output value and internal filter storage locations by plus or minus one circle.

Claim 56 (previously presented): The method of claim 11 wherein adjusting the output value of the distance-based filter and internal filter storage within a selected output range further comprises adjusting the output value and internal filter storage locations by plus or minus one circle.

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Claim 57 (previously presented): The filter device of claim 14 wherein the means for limiting the output value within selected limits of normalization further comprises a means for adjusting the output value and internal filter storage locations by plus or minus one circle.

25 Claim 58 (previously presented): The system of claim 21 wherein the function of limiting the output value within selected limits of normalization includes adjusting the output value and internal filter storage locations by plus or minus one circle.

Claim 59 (previously presented): The computer program product of claim 28 wherein the fifth computer-readable program code means further comprises computer-readable program code means for adjusting the filter output value and internal filter storage locations by plus or minus one circle.

- 5 Claim 60 (new): The method of claim 1 wherein initially normalizing a value of an input sample to a range centered on the locus further comprises selectively adapting the normalizing range as a function a range of the data samples.